

*On the Vascular System of the Ascidia.* By Prof. C. HELLER.

It is well known that the heart in the Tunicata contracts sometimes in one and sometimes in the other direction, and that its contents are driven sometimes into the dorsal and sometimes into the ventral vessel; but hitherto no close investigation has been made of the intimate structure of this organ, or of the nature of the vessels springing from it in the Ascidia.

In the Ascidia the heart forms a cylindrical, elongated, more or less curved tube, generally placed at the hinder margin of the stomach, and more rarely further forward, near the latter. It is always enclosed by a special, thinly membranous pericardium, with which it is connected towards the dorsal side. The wall of the heart consists of a layer of thin, delicate muscular fibres, which show distinct transverse striation. These muscular fibres are not placed parallel to each other, but form an elegant network, uniting with each other here and there and then again separating, so as to leave small interspaces between them.

The two large vascular trunks which originate directly from the heart, and of which one runs forward along the dorsal part of the branchial sac above the endostyle, and the other on the ventral part of the branchial sac below the œsophageal channel, also exhibit a similar structure of wall; in them also the network formed by delicate transversely striated muscular fibres may be observed. These two vascular trunks therefore appear to be direct continuations of the heart, from which they cannot be distinguished by their structure; and they contract like the true heart, although in a less degree.

As regards the other vessels, those which are distributed in the wall of the branchial sac and in the external envelope are provided with proper walls; but the course of the blood in the inner mantle seems to be lacunar. The branchial vessels are all furnished with an endothelium consisting of small elongated cells. In the walls of the large transverse vascular trunks of the branchial net smooth muscular fibres are distinctly observed; they run in a crooked course and forming meshes with their neighbours towards the projecting longitudinal partition.

The vessels which, in the simple Ascidia, run to the outer tunic and then ramify, are also remarkable in their form and structure. They are always double vessels, which only communicate with each other at the extremity of the last ramifications. The blood flows outwards in one vessel and inwards in the other. The largest trunks exhibit in their walls a distinct layer of smooth muscular fibres, both longitudinal and annular. The latter are by far the more numerous and lie close together, whereas the longitudinal fibres are more scanty. In the further course of these vessels the annular muscular fibres also become rarer; and in the finer terminal ramifications the muscular elements are entirely wanting, and the wall consists of a thin membrane composed of roundish cells. The vessels are not connected with the external envelope, but lie quite loose in lacunæ.

The blood circulating in the vessels is frequently coloured; and its colour is due to that of the blood-corpuscles. Thus *Ascidia fumigata* is distinguished by the greenish-yellow colour of its blood, and *Ascidia mentula* and *mamillata* by a more brownish colour, whilst in some species, e. g. *A. intestinalis*, the blood appears quite colourless.—*Anzeiger der Akad. der Wiss. in Wien*, October 16, 1873.